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THE

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CANADIAN
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Food Makes a Difference*

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CANADA at war cannot afford to ignore the power that is obtainable by eating the right foods. Today I want to tell you some of the reasons why food makes a difference, and why we should do something about it right now. This can be done conveniently by tracing, after a fashion, the history of nutrition, which is really a very new branch of science. I shall show briefly what nutrition meant in the last war, what has been learned since then, evidence of the fact that this knowledge is not being applied in Canada because many Canadians are undernourished, and finally what nutrition means at the present moment.

IN THE LAST WAR

In the last war, nutrition meant simply getting enough to eat, and it was described in terms of calories or units of energy. Soldiers need and receive a generous number of extra calories. Munition workers need them, too.

That was almost the total of applied nutrition in the last war, but it is still important in this war. People must have enough to eat in order to do a good day's work. If they do not get enough, then it is impossible to get the maximum health and production returns. Yet we have evidence that thousands of war workers rush off without breakfasts, and often eat an inadequate lunch. In the long run, this will undermine their health, and in the meantime they are not turning out the production they could. More than that, they are more liable to disease and epidemics. The United Nations need that production. Canada needs all our food-power.

**An address given before the Association of Canadian Advertisers in Toronto on November 12, 1942.*

MORE THAN JUST CALORIES

But our food-power is more than just calories and enough to eat. In the last twenty-five years the study of nutrition has brought to light many new facts about food. Indeed the importance of minerals and vitamins is now emphasized so much that many people have forgotten all the other constituents of food.

During the period 1918-1940, then, much has been learned about nutrition. We know the importance of calcium and phosphorus, especially working with vitamin D or sunshine in building strong bones and teeth. We know more about the role of iodine in relation to goitre. We know more about the relation of iron to anaemia. We know that vitamin A is necessary for certain functions of the eyes, and for healthy skin. Vitamin B_1 or thiamin is helpful in maintaining healthy nerves, and appetite, and is useful anywhere that metabolism is increased, such as in vigorous muscular exercise. Other B vitamins have been discovered and many are better known chemically than they are physiologically. That is, chemists are as familiar with them as you are with salt or sugar, yet we are uncertain about what they do. Fortunately, we are now calling them by names rather than by letters, because this removes from them some of the mysterious quality formerly possessed. Vitamins are real things and are essential for health and efficiency. Of the B vitamins the role of niacin in pellagra is much better understood, and riboflavin has assumed great importance in recent years. Riboflavin deficiencies are being recognized as of great significance in widely diverse conditions, often related to the eyes.

Vitamin C, or ascorbic acid, is found in such things as oranges and lemons whose effects on scurvy have been known for 200 years. Vitamin C is still intensively studied, and may be a very important factor in fatigue and anaemia, and also helpful in certain industrial conditions.

Other vitamins are also common in current nutritional discussions.

In the midst of this vast and complex advance in the scientific side of nutrition, we must now enquire how much has it meant to the Canadian public: in other words, how much of it is being applied by the people, or by industries, or by governments or by anyone else?

THE KNOWLEDGE OF NUTRITION IS BEING POORLY APPLIED

There is a famous picture of a boy carrying his father's rooster, which won a prize at the county fair. It is a prize rooster but the boy has rickets—a deficiency disease. He is bowlegged and flat-footed. Nutrition or proper feeding has indeed been better applied to livestock than it has been to human beings.

This idea is further borne out by the chart, published some months ago, showing results of Canadian Dietary Surveys in 1939-40. These surveys, plus two or three others, furnish the only information on nutritional status of Canadians which we have. Unfortunately, we know very little about the status of the many people in rural areas of Canada. Even these surveys

in urban areas cannot be taken as necessarily representing the Canadian picture.

Limited as it is, however, we have here a definite picture, and it is not a pretty picture.

In some parts of Canada there were even a few people not getting enough calories, that is, not getting enough to eat.

Somewhat more common was a deficiency of protein, which is important for proper growth and to a less extent for muscular activity, with its attendant repair of tissue.

In some cases there was a deficiency of vitamin A, which is so important for the eyes and skin, and seems to help us resist infections.

Slightly commoner still was a deficiency of iron, which is associated with certain types of anaemia, and can, therefore, have a profound effect on general well-being.

Still more common was a calcium deficiency. This mineral is important for good bones and teeth, and in most cases the lack was commonest in the diets of children. These children were thus storing up trouble for a future time. They are our workers and soldiers of tomorrow and, therefore, need a better diet than indicated here.

The two commonest deficiencies found in these Canadian surveys were vitamin C and vitamin B_1 or thiamin. Both of these vitamins are important, as has already been indicated. Vitamin B_1 or thiamin is helpful in maintaining healthy nerves, and appetite, and is useful in increased muscular exercise. Vitamin C, or ascorbic acid, is related to scurvy, that disease so dreaded by mariners in olden days, and is very important in some types of anaemia and in fatigue. Vitamin C, like vitamin B_1, is lost in perspiration, a fact which may occasionally be important in industry.

To sum up these findings is difficult, but the statement has been made that, roughly speaking, only 40 per cent of the people studied were adequately nourished, 40 per cent were in a border-line state, and 20 per cent were seriously undernourished.

What does this mean in terms of common ailments? It means increased sickness and fatigue. It means backaches and sore eyes, and sore muscles, and tired eyes, and apathy, and accidents, and stomach troubles, and worry, and more colds, and many other common causes of absenteeism or decreased production.

Let me be quite clear on one point. Canada is actually healthier now than twenty-five years ago. Public health services have worked many wonders. Great strides have been made in immunization, sanitation, etc. But the fact remains that many people are still not as healthy as they could be, especially if they were well-fed. In fact, we are now realizing that many ailments which people used to take as part of life itself, could be avoided by eating the right foods.

Aside from all these scientific experiments on rats and things, what evidence is there that food really does make a difference? You may well ask, because results on human beings take time to show, and to collect. A few

examples will exemplify the types of effects that may be expected, namely, general physical condition, growth, reduction of accidents, etc.

Take the experiment at Canterbury, England, just before the war. Eight hundred and thirty-four men who had been rejected from active service in the army were put in a camp, and given regular work and a special diet. As a result, 87 per cent of these men were later accepted into the army. Food had a part to play in that change. That proves that a change in eating habits can influence your whole life. We are still far from applying this idea here in Canada.

Then there is the question of growth. In the Canadian Army, the average gain in weight in the first month is seven pounds. And that is in spite of hard work which is often unfamiliar. But remember that the fundamentals of nutrition are being applied to our armed forces, and that helps to account for increased development and weight after joining up.

Growth results from good nutrition are even more startling when dealing with children, especially under-privileged children. In the recent K-Club experiment in Toronto, growing boys aged 9-12 were fed a special noon lunch. They gained on the average three pounds in three months, against a normal gain for healthy children of about 1½ pounds. This shows both the efficacy of a good lunch, and also the fact that they probably needed it. A significant feature of these lunches was that they were designed to give so much of the important protective minerals and vitamins that adequacy for the day was assured regardless of the other meals eaten. It was also noteworthy that the boys learned to like new foods and carried ideas back to their homes.

Finally, there is the difference that food makes in dollars, and in bombers, and in accidents. Let's look at some of the figures.

In one recent year over 30 million working days were lost through illness, meaning a loss of nearly 85 million dollars in income alone.

There is the estimate for 1941 of a total cost to Canadians of their illness, amounting to 250 million dollars.

From various calculations I have arrived at an estimate of 9 million man-days lost through preventable illness in Canadian industry, equivalent to about 2,000 bombers.

Then there is the proved fact that in one Canadian plant there were 27 per cent fewer first-aid treatments after installing a lunchroom.

FOOD MAKES A DIFFERENCE EVEN THOUGH IT IS NOT THE ONLY FACTOR IN HEALTH

What foods make this difference? Is there something special or mysterious about them? No, curiously enough they are very simple and familiar, yet for various reasons they are not being used properly by the Canadian public.

Canadian diets could be improved by the adequate use of dried beans, carrots, whole-grain cereals, citrus fruits, cheese, green and yellow vegetables, liver, milk, dark molasses, certain pork products, peanut butter, potatoes and

tomatoes. These have been summed up in Canada's Official Food Rules. There are really five groups although sometimes printed as though six.

CANADA'S OFFICIAL FOOD RULES

These are the Health-Protective Foods:

1. Milk
2. Fruits
3. Vegetables
4. Cereals and Bread
5. Meat, Fish, etc.
   Eggs.

If everyone in Canada were following these food rules every day there is no doubt that we would be on our way toward better health, happiness and a more effective war effort.

WHAT, THEN, IS TO BE DONE?

The causes of malnutrition in Canada are probably threefold.

(1) Economic, because some people cannot afford an adequate diet. But our national income is rising and this cause may be shrinking. However, although a higher income tends to be associated with a more adequate diet, the Canadian studies showed examples of inadequate diets even with plenty of money being spent on food. Therefore, there are other causes of malnutrition.

(2) One of them is educational, and the Canadian Nutrition Program which has been prepared in booklet form by Nutrition Services, Department of Pensions and National Health, Ottawa, is now being organized to assist people to learn more about nutrition.

(3) The third cause is indifference and a lack of application of nutrition. Sometimes I think it is the biggest cause.

The publicity which you are organizing for the Canadian Nutrition Program is just beginning next January but it is a long-term matter. I want you to realize that this is the first official public announcement of the Canadian Nutrition Program. Other official statements may be expected in the next few days and weeks. This publicity is essential to make the Canadian people understand the importance of nutrition right now. It can also make everyone familiar with these Food Rules and that will be a big start on our educational program. Already you have indicated considerable support and I want you to know that this is appreciated. This is constructive support and not just talk. Your support as advertisers and advertising media is, therefore, vital to the war effort, and to the whole future of Canada in telling the public that food makes a difference, and that Canada needs more of her food-power right now.

WHAT EXACTLY IS THE CANADIAN NUTRITION PROGRAM?

In general it is a long-term comprehensive program, not just a campaign. In a broad way, the four activities of Nutrition Services are all part of the program: namely, (1) food facilities in war industries, (2) assisting in nutritional research, (3) advice to other departments on nutrition, (4) informing the public.

In particular our attack at the present time includes the following:

1. War industries—inspecting food facilities, luncheons, etc. I wish we had even more contact with the workers so as to help them at home, too. This will expand.

2. A close connection with the Foods Administration is being maintained.

3. Information to the public is being organized in various ways: classes, school lunches, school courses, bulletins, radio.

Our aim: to help everyone in Canada toward the health that can come from eating the right foods.

Nutrition in War Industry*

FLORENCE IGNATIEFF
Manager of Cafeteria, Scarboro Plant
The General Engineering Company (Canada) Limited
Toronto

THERE are three principles which should be practised in nutrition in war industry:

1. Attractive meals should be offered to the workers.
2. These meals should be produced most economically so that they may be offered at a price which the workers will pay.
3. The principles of nutrition should form the basis on which these meals are arranged and produced.

The dietitian, in the practice of her profession, is concerned with these three problems—attractive, economical, nutritious meals. In all society these are the basic principles. They are very similar in all situations where food is prepared. In the home, in the school, in the hospital, in commercial restaurants, and in industry, nutritious meals must be offered, and, most important, these meals must be consumed.

In a war industry the immediate aim of all effort is the production of war materials. The provision of a canteen or restaurant where attractive, nutritious, economical meals are offered, is an essential service which is a necessary part of this effort. These meals assist production in combating fatigue and discouraging the consumption of poor lunches. Rest-period refreshment increases the efficiency of workers and it is believed that the meals improve the health of workers whose diet is not up to standard.

The following is an outline of our attempt to practise the principles of nutrition and produce attractive, economical meals, using our knowledge of scientific nutrition in the planning and production.

I. Attractive Meals

Organization

In our plant the canteen is organized as a service for the workers, that they may be able to secure attractive meals and that they will buy those meals. These meals are arranged and produced on the basis of a scientific knowledge of nutrition. The workers may carry their own lunches and our success is measured by the proportion of the workers who eat the meals.

The department is organized and directed with individual work plans for all workers. The staff works on the preparation of the meal for each shift so that each meal is freshly prepared. Each section of the department is directed by a supervisor who is responsible to the dietitian.

Raw food materials proceed from the stores to a preparation section

*Presented before the Sections of Industrial Hygiene and Public Health Nursing at the thirty-first annual meeting of the Canadian Public Health Association, held in Toronto, June 1-3, 1942.

where a supervisor directs their preparation for cooking. The orders from each section of the department are filled and the prepared materials are sent to the section. For example, vegetables in various sizes and shapes are ordered by the cooks for soups and stews; vegetables and fruits are ordered by the salad section; fruits and fruit juices are ordered by the bakery. These materials are made into the items called for on the day's menu. The supervisor of each section arranges that the dietitian tastes each item during its preparation and that each product is officially passed as suitable before it is sent to the serving counters. The food is supplied to serving counters in a steady flow at a rate which is determined by the number of customers.

The dietitian follows the serving of the meal to check the appearance and taste of the food as it passes to the customers. Finally, three choices of three-course meals (2 hot, 1 salad plate) are offered to the workers at 35 cents or 25 cents per meal.

Studies of the Likes of the Workers

All servers report daily the response of the plant workers to different foods. The supervisor of service relays these ideas to the dietitian.

Salads: In serving salads a preference is found for cooked vegetables. Therefore, we cook the vegetables for salads a very short time and include raw vegetables in a mixture. This study of the likes of the workers has increased the salad meals up to 40 per cent of the total number of meals. The workers demand fruit salads daily.

Desserts: Apples and other fresh fruit offered as an extra variety of desserts are now demanded by the customers.

Beverages: Milk consumption was increased by including chocolate dairy drink and buttermilk in the varieties. Coffee served during rest periods was made with 25 per cent milk and preferred by the workers.

Education

When consistently attractive meals are offered to workers their confidence grows and they educate one another to try new foods. This enables the canteen to introduce more variety in the meals. When we opened our canteen we concentrated our whole effort on the planning, the preparation, and the serving of attractive meals. The only experienced workers we had were highly trained men cooks who prepared the hot dishes. The dietitians worked beside the other workers teaching and guiding them to produce attractive food. As we continue to operate we are developing a larger organized department which the dietitians can control and guide intimately and carefully. That close guidance and the intimate knowledge of the actual food being produced have not been lost, although the department has increased fourfold. Any development in the organization is introduced to extend the influence and the control of the department by the dietitians.

II. LOW COST MEALS

Organization

The dietitian and the assistant dietitian control directly the whole department through close contact with the supervisors and their workers.

The buying, menu planning, and the use of left-overs, are personally directed by the head dietitian and the assistant dietitian. The supervisor of each department reports daily on the quantities used, the production and the left-overs of her section, to the dietitians. The assistant dietitian scrutinizes the left-overs and supplies on hand, twice daily. All fat is rendered. The dining room and kitchen garbage is carefully watched. As the percentage of waste determines the cost of the meal more than the original cost of the materials, the control of waste is emphasized. This statement, that waste determines the cost of the food, is based on our experience. We purchase the best quality of meat—not a fancy quality. We arrange our menus to use that meat in dishes which are most attractive, but, to avoid waste, we plan the menus to use the meat for the most economical butchering, i.e., that there shall be no waste. Each day, each meal, there are left-overs. If those left-overs are used immediately they yield more attractive dishes. They require less labour and fewer additional ingredients to be prepared for further use. Therefore, an intelligent control of the waste and left-overs from each meal can control the cost of the meals. We have developed in our department a keen consciousness of waste in all our workers.

Education

The company operates the canteen. As this factor assures the workers that there is no profit made on the meal offered, the workers become confident that the meals are the lowest price obtainable. They realize that they are receiving the most value possible for the money they pay.

III. SCIENTIFIC KNOWLEDGE OF NUTRITION APPLIED

Organization

This includes daily teaching in methods of food preparation.

Soups of highest nutritive value include fresh meat bones, vegetable water, fresh vegetables as far as possible. Canned tomatoes are used as much as possible, never tomato juice or tomato puree. All varieties of dried beans and peas are used for iron content.

Meats: All meat juices and vegetable juices are used in gravies. Gravy is required in large amounts and we have developed a vegetable gravy.

Vegetables are steamed to preserve minerals and vitamins. Four fresh vegetables are served weekly in winter. In summer, July 1st to November 1st, fresh vegetables only are served.

Desserts: Attractive fruits are served and demanded. Apples are very popular. We use domestic quality but have educated customers to buy on taste and economize on appearance.

Milk: Milk consumption is very high. It is demanded at all times. We allow milk to be substituted for any article on the menu.

RESULTS OF ORGANIZATION TO STIMULATE PROPER CHOICE OF FOOD

Refreshment during the mid-shift rest periods includes three varieties of

milk, fresh fruit juice, and coffee made with 25 per cent hot milk added. The workers consume an average of four ounces of milk per person in these periods. In the dining room we serve four ounces of milk per customer.

We serve 25 per cent of customers with milk as a beverage at their meal, 20 per cent with coffee at their meal, and 55 per cent with tea at their meal.

In the dining room we serve 60 per cent of customers with brown bread and 40 per cent with white Canada-approved bread.

Education

In this plant the complete co-operation between all departments includes the canteen, since it is operated by the plant. Education to develop the attitude of proper healthy eating is achieved through the personnel department and the medical department. The personnel department's officers mingle daily at all times with the workers. The medical department has public health nurses in direct touch with the workers. These nurses are interested in the general welfare of the workers and assist greatly in this education on nutrition habits.

All our problems, such as night meals, choice of salad, etc., have been helped by the education carried on in these two departments. Lectures on eating habits, such as a healthy breakfast, before work, and proper choice of foods in the canteen at meals, are given during the training period of the worker. These ideas are continuously brought before the workers during their work.

In conclusion: we are attempting in this manner to provide and encourage the consumption of a good healthy dinner in our war plant. We have adequate equipment; we have the inspiration and co-operation of the management of the firm to assist us in our attempt. We have an excellent staff to whom we give careful and consistent training and good wages. The support for our aims which we receive from the management enables us to constantly inspire our staff as they work daily in preparing and serving proper food to these workers. The whole department feels that we have been given an opportunity to do a service.

Our department, inspired by the encouragement and assistance we receive from the whole organization in which we work, follows this outline to assist the war effort by providing attractive, nutritious, low-cost meals for the war workers.

The Immunization Program in the Royal Canadian Air Force*

A. H. SELLERS
Squadron Leader, R.C.A.F. Medical Branch

THE practice of aviation medicine comprises those phases concerned with personnel selection and those concerned with health maintenance. Both involve application of the principles of preventive medicine under training and operational conditions. Medical selection begins at recruiting centres and, particularly in aircrew, continues throughout the service career. All aircrew trainees are re-examined approximately 10 weeks after initial entry by specially constituted medical boards either at initial training schools or at wireless schools. Regular annual re-examination of all flying personnel provides a constant medical check on the selection of members of aircrew. In addition, re-examination of air or ground personnel is carried out on every occasion upon which there is a possibility that medical category may have been affected by illness, injury, accident or other cause.

Health maintenance of all flying and non-flying personnel under both training and operational conditions is one of the principal responsibilities of a Medical Officer in the R.C.A.F. Medical Branch. Of paramount importance in this field is the application to the fullest possible extent of all available preventive measures, including specific immunization. In this presentation, attention is confined to the R.C.A.F. immunization program and to certain ancillary aspects of communicable-disease control.

The British Commonwealth Air Training Plan involves movement of personnel after each stage of training is completed. A trainee pilot, for example, proceeds from an "M" depot to an initial training school and thence to an elementary flying training school, service flying training school, and operational training unit. Since such movements may traverse several provinces, this factor is important from the medical standpoint because it complicates the problems of infectious-disease control, increasing the risk of infection spread by carriers and incubating cases from station to station and to the civilian population.

Ordinary sickness and injury are important elements to be reckoned with in the air-training program. An illness of seven or more days' duration for certain groups of trainees means "hold-over" to a later course. The R.C.A.F. Medical Branch has, therefore, a vital responsibility in the training program and it seeks to meet this responsibility by keeping non-effectiveness due to sickness at a minimum by limiting the incidence and spread of infectious diseases, and by reducing the need for interference with movement of personnel due to the application of quarantine measures.

**Presented at the thirty-first annual meeting of the Canadian Public Health Association, held in Toronto June 1–3, 1942, in conjunction with the twenty-eighth annual conference of the Ontario Health Officers Association.*

PREVENTIVE MEASURES IN THE R.C.A.F.

In war-time, health measures must be practical. Measures whose results are uncertain or which interfere significantly with the training or operational activities of troops must be avoided. The success of attempts to control infectious diseases depends upon the extent to which we can influence any or all of the leading factors involved in spread of infection — susceptibility, dosage of infection, exposure or opportunity for infection, time of diagnosis, and promptness of case isolation.

Attempts to control communicable disease by quarantine have (as in civil experience) regularly been found inadequate. The effectiveness of quarantine depends among other things upon the length of the incubation period. Opportunities for spread of the disease among contacts who can neither be identified nor located, limit its value. This concerns particularly diseases in which the incubation period is long and the range wide (chickenpox 14-21 days and mumps 12-26 days). The frequent movement of Air Force personnel from unit to unit and province to province multiplies the difficulties in applying quarantine measures which disrupt the training program, frequently to little avail.

Careful daily observation and supervision of known contacts and close medical supervision of *all* personnel during an outbreak are more practical and more effective measures, particularly in those diseases for which no specific protection can be afforded by immunization. Medical re-check and observation of all new drafts arriving at any unit, supplemented by the routine transmission to the Medical Officer at the new unit of any pertinent information on exposure, are most essential.

Control of spread of infection has been along three lines: first, by the provision of specific protection by immunization where applicable (diphtheria, typhoid fever, tetanus, smallpox and scarlet fever); second, by attempts to intervene n the infection cycle (respiratory diseases, venereal infections); and third, by early diagnosis and isolation of cases (all infectious processes).

Non-effectiveness due to infectious and communicable disease (including venereal disease and the acute respiratory infections) accounts for two-thirds of hospital admissions and one half of all days of hospital care. These are the groups most amenable to control and are those, therefore, which demand our focus of attention.

It will be recalled that while spacing of beds and so-called "barrier nursing" yielded satisfactory results in certain diseases in Great War I, such measures did not prevent the spread of chickenpox, measles, mumps, etc. Furthermore, interest in the hypothesis of air-borne spread of infection has been recently revived as a result of scientific evidence. The importance of dust as a vector is being stressed.

These things are important to Service medical authorities, particularly in considering the control of respiratory infections, since it is clear that "barrier nursing", bed-spacing, baffle-boards and the like are no longer to be

looked upon as primary control measures in specific or non-specific infections transmitted by secretions from the upper respiratory passages. Any measures for the control of disease spread or caused by infectious agents emanating from the upper respiratory passages must take into account the channel of infection. It is not to be expected that diseases in which random infection plays a great part can be controlled by directing efforts at the sleeping quarters alone. In the case of upper respiratory infections particularly, there are to be considered, in addition, the opportunity for and the occurrence of multiple exposures (1, 2, 3, 4, 5).

SPECIFIC IMMUNIZATION

Prior to June 26, 1941, the R.C.A.F. immunization program comprised vaccination and three doses of a combined T.A.B. vaccine with tetanus toxoid. On that date, routine Schick and Dick testing followed by the immunization of all susceptibles was added.

The need for immunization against diptheria and scarlet fever was made clear by evidence of a higher group susceptibility among Service personnel than had been previously suspected. Information as to the proportion of young healthy adults who are susceptible to diphtheria and scarlet fever was secured by the R.C.A.F. during the winter of 1940-41 from Schick and Dick tests done on a large group of trainees during outbreaks of diphtheria and scarlet fever among Service personnel.

Group Susceptibility to Diphtheria and Scarlet Fever.

The first series of Schick tests (8,561) on unselected groups of men revealed that over 50 per cent were Schick positive (table I).

TABLE I

SCHICK TEST READINGS—2ND AND 6TH DAY
R.C.A.F. PERSONNEL

Schick Reading at 48 hrs.	Final Schick Reading*						Total	
	Positive			Negative				
	Number	*% of Pos. Tests*	*% of All Tests*	*Number*	*% of Neg. Tests*	*% of All Tests*	*Number*	*Per Cent*
Positive.....	4,088	80.9	47.8	Positives not re-read			4,088	47.8
Negative.....	541	10.7	6.3	1,884	53.7	22.0	2,425	28.3
Sensitive.....	425	8.4	5.0	1,623†	46.3	18.9	2,048	23.9
TOTAL.....	5,054	100.0	59.1	3,507	100.0	40.9	8,561	100.0

*"Sensitives" and "negatives" re-read on 6th day.
†When toxin reaction larger than control on 6th day, classed as "sensitive-susceptible," otherwise classed as "sensitive-immune" (negative).

Of those tests read as negative at 48 hours (about 28 per cent of the total) roughly 22 per cent were positive on the sixth day, i.e. 6 per cent

of the total tested (table I). Those read as "Schick-sensitive" at 48 hours (about 24 per cent of the total) were arbitrarily divided into two groups on the sixth-day reading, i.e. "sensitive-immunes"— those whose control reaction* was larger than the toxin reaction, and "sensitive-susceptibles"— those whose control reaction was smaller than the toxin reaction. On this basis, one-fifth of the "sensitives" were classed as "susceptible"† (5 per cent only of the total tested). The final (sixth day) readings of two large groups of tests read as "negative" and "sensitive" or non-interpretable at 48 hours are given in table II.

TABLE II

NEGATIVE AND NON-INTERPRETABLE REACTIONS RE-READ ON SIXTH DAY

Final Schick Reading	Reading at 48 hours			
	Negative		Non-Interpretable	
	Number	*Per Cent*	*Number*	*Per cent*
Positive.....	541	22.3	425	20.7
Negative.....	1,884	77.7	1,623	79.3
TOTAL.....	2,425	100.0	2,048	100.0
Per cent of † Total Tested.....	28.3	—	23.9	—

†See Table I.

One half of all enlisted personnel may, therefore, be expected to be susceptible to diphtheria as measured by the Schick test. This represents an important risk of diphtheria in the Service. Furthermore, personnel proceeding overseas are exposed to an environment in which diphtheria is much more prevalent than in Canada. The case rate (per 100,000 population) for diphtheria during the years 1937-39 in South Australia, for example, was 123 compared with 36 in New Zealand, 153 in England and Wales, and only 8 in Ontario. The death rates per 100,000 population respectively were South Australia, 4.7; New Zealand, 1.5; England and Wales, 7.3; and Ontario 0.5 (6, 7, 8).

Carefully controlled studies have shown that a reduction in diphtheria incidence of 90 per cent or over can be achieved by the administration of diphtheria toxoid (9, 10, 11). It has also been shown that control of cases by immunization of susceptibles controls the spread of infection. The evidence for this statement lies not only in the reduction of cases and deaths from the disease but in the decline in the number of carriers.

In the case of scarlet fever, immunization is the best weapon of control

*The Schick test control is diphtheria toxoid diluted to contain 0.1 Lf's per cc.

†Although initially the immunization program called for one dose of 1/10 cc. alum-precipitated toxoid for all "sensitive-susceptibles", evidence that this group develop immunity readily even with the small stimulus provided by a Schick test, together with the fact that the "sensitive-susceptible" group is quite small (5 per cent of total) and the difficulty of handling such persons in large immunization parades, led to the abandonment of the practice. Only those Schick tests read as negative at 24 to 48 hours are now re-read on the fifth to seventh day.

available and there is considerable evidence that a substantial reduction in incidence may be effected by such immunization (12, 13). While not in itself a severe disease in Canada, scarlet fever is particularly serious by reason of the high incidence of complications and the prolonged periods of isolation and convalescence required. This aspect of the disease is particularly important in flying personnel.

Data on group susceptibility to scarlet fever as reflected by Dick-test findings on 24,000 airmen and 2,000 airwomen are given in table III.

TABLE III*

SCHICK AND DICK TEST FINDINGS
SIX MONTHS TO APRIL 30, 1942

Service	Dick Test			Schick Test†			
	Pos.	*Neg.*	*Total*	*Pos.*	*Neg.*	*Sens.*	*Total*
R.C.A.F.....	7,057	16,998	24,055	11,563	8,944	3,263	23,770
R.C.A.F. (W.D.).	932	1,090	2,022	1,019	620	390	2,029
SERVICE	*Per Cent*			*Per Cent*			
R.C.A.F.....	29.3	70.7	100.0	48.6	37.7	13.7	100.0
R.C.A.F. (W.D.).	46.1	53.9	100.0	50.2	30.6	19.2	100.0

**Differences from Schick test data in Table I, especially in the proportion of "sensitives", are noted. The latter were collected from one station.*
†Final readings.

The proportion of airwomen found to be Dick positive has been consistently higher than that for males — 46 per cent compared with 29 per cent. Schick-test findings show more "sensitives" and fewer "negatives" among airwomen, the proportion of "positives", however, being essentially the same — 50 per cent.

These data show that a large proportion of all R.C.A.F. personnel are susceptible to diphtheria and scarlet fever on the basis of the tests employed. The only satisfactory measures of control available are routine Schick and Dick testing followed by the immunization of all susceptibles and this is the plan which is now in effect.

SCOPE OF THE PRESENT IMMUNIZATION PROGRAM

The complete immunization program in its present form and the routine practised may be summarized as follows:

(a) *Vaccination* — observed at 24-48 hours and again on 6th day.
(b) *Combined T.A.B. vaccine with tetanus toxoid (T.A.B.T.)**—

**The combined typhoid-paratyphoid vaccine with tetanus toxoid contains in each cc. 750 million typhoid, 250 million paratyphosus Alpha and 250 million paratyphosus Beta organisms. In preparing the vaccine, the typhoid-paratyphoid emulsions are suspended in tetanus toxoid so that practically three doses of one cc. of tetanus toxoid are administered in the course of inoculations. The tetanus toxoid contains on the average 8 Lf's per cc. Measurements of the antigenic response in members of the armed forces have shown excellent antitoxin content in 90-95 per cent of individuals.*

three doses of 1.0 cc. each subcutaneously at intervals of three weeks with a re-inoculation dose of 0.5 cc. annually.

(c) *Schick test* — read at 24-48 hours. "Negatives" on that reading are re-read on the 5th to 7th day.

(d) *Dick test* — read at 22-24 hours.

(e) *Scarlet fever toxin* — five doses of 1.0 cc. each in graded strengths* at intervals of one week given to all Dick "positives".

(f) *Diphtheria toxoid (alum-precipitated)* — two doses of 1.0 cc. each at an interval of four weeks to all persons read as Schick positive either at 24-48 hours or at 5-7 days. Schick "sensitives" receive no toxoid.

All R.C.A.F. and R.C.A.F. (W.D.) personnel are included. The testing and immunization of all new entries to the Service are initiated at "M" depots or on entry at the first school in Canada. Testing and immunization are completed at the station or unit at which they were commenced or at such units or stations to which personnel are posted prior to the completion of the course of necessary inoculations.

The program requires a minimum period of six weeks. The great bulk of immunization procedures is completed at "M" depots where special clinics are set up to handle large numbers of men expeditiously. On smaller stations the volume of tests and inoculations is small enough that the station medical officer can handle them effectively.

Recording of Immunization Procedures.

A special 3 x 5 card is used for recording tests and inoculations (figure I).

R.C.A.F. IMMUNIZATION RECORD CARD

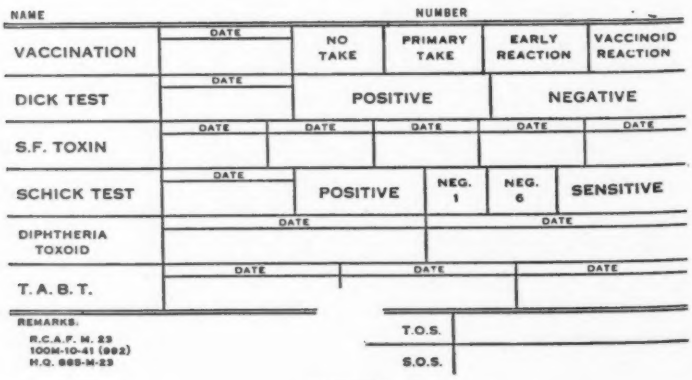

FIGURE I

This card is retained by the unit until the individual concerned is posted elsewhere. If immunization is not complete at the time of posting, the card is passed to the next station or unit, where the record is carried to completion. When tests and inoculations are completed, this card is

*Strengths are successively 330, 1,000, 2,300, 5,000 and 10,000 S.T.D. per cc.

retained by the individual as evidence of inoculation state. A permanent record of all tests and inoculations is made on the Service medical envelope.

Schick Test.

It has been demonstrated that age per se is a factor in the development of sensitivity to diphtheria toxoid (14). (Those who are sensitive on the "reaction" test are analogous to those giving a positive tuberculin test and to those showing an "early reaction" on re-vaccination (15, 16), which "indicate, respectively, a sensitivity to tubercle bacilli or to vaccine virus but give no indication of immunity".) The high frequency of Schick "sensitives" in adults (table III) renders the use of the Schick control (reaction test) invariably necessary if the administration of diphtheria toxoid is contemplated.

In the adminstration of the Schick test to R.C.A.F. personnel, a control of diluted diphtheria toxoid ("reaction test") is regularly employed and all individuals who at the 24-48 hour reading show an area of redness or pigmentation at the site of both the toxin and control injections are classed as "sensitive".

While it has been shown that appropriate adjustment in toxoid dosage may permit the administration of toxoid without significant reactions in sensitive individuals (17), the administration of toxoid to such individuals requires more personnel and time than is available under a large-scale immunization program. In many cases such individuals are actually immune to diphtheria by accepted standards or the small stimulus of the Schick test is sufficient to raise the immunity to the desired level. Furthermore, the amount of diphtheria occurring among Schick "sensitives" is only a fraction of that among unselected controls (10). For these reasons no alum-precipitated toxoid is now given to this group.

Dick Test.

In the interpretation of the Dick test, readings have been made at 22-24 hours after the injection, using daylight or strong artificial light as far as possible. Any degree of redness, even the faintest pink, one centimetre or over in any diameter has been taken to indicate susceptibility to scarlet fever and all such tests have been read as positive. Any doubtful tests are read as positive.

Early difficulties with the Dick test under Service conditions were to be expected. These difficulties were those experienced elsewhere and were manifested by wide variation in the number read as Dick positive at various units; both technique and interpretation have been factors. The concentration of Dick testing and immunization procedures at larger units has improved the picture substantially.

Reactions Following Immunization Procedures.

Personnel are kept under observation for a period of at least one half-

hour after each inoculation. A sterile syringe containing epinephrine hydrochloride (1 in 1,000) is kept readily available for subcutaneous administration in the event of severe reaction. Immunization procedures are avoided near week-ends in order to obviate danger of reactions away from stations. The further precaution is taken that pilots do not fly solo for thirty-six hours after any inoculation.

Inoculation reactions, local or general, have presented no significant problem. Severe reactions are uncommon. Among males one per cent and among females two per cent only have any reaction sufficient to require "excused duty". It is particularly noteworthy that the administration of alum-precipitated diphtheria toxoid has not occasioned a significant volume of reactions. Abcesses are very uncommon.

In 4,100 consecutive vaccinations among males only three reactions occurred in which symptoms, general or local, were of a severity sufficient to require the airmen to be "excused duty". Among women, reactions have been more frequent. In a group of 1,300 airwomen vaccinated, 19 had reactions requiring "excused duty".

RESULTS OF THE IMMUNIZATION PROGRAM

Smallpox.

Over 20 per cent of trainees have never been previously vaccinated. In a group of 10,000 smallpox vaccinations, the proportion of primary "takes" has run at 25 per cent. Failures on vaccination in previously unvaccinated persons have been less than one per cent. There have been no reported cases since September, 1939.

Tetanus.

No cases of tetanus has developed among Air Force personnel in Canada or overseas.

Typhoid Fever.

Only three cases of typhoid fever have been reported among Air Force personnel during the past two and one-half years. One of these cases had had only one dose of T.A.B.T. The second and third cases had both had a complete series of T.A.B.T. inoculations — one occurring almost twelve months after the last inoculation and the other eight months after.

Diphtheria.

In the spring of 1941 an outbreak of diphtheria occurred at a large Air Force unit in which a total of 62 cases occurred. Since the diphtheria immunization program was placed in general operation (July, 1941) not one case has occurred at this unit and only occasional cases have occurred elsewhere. During the six months to May 1, 1941 (two months prior to the introduction of diphtheria immunization), a total of 59 diphtheria cases was reported. During the corresponding six months to May 1, 1942, only 9 cases were reported.

The pertinent facts on these 9 cases discharged from hospital are:

Case No. 1. Schick positive — two doses of alum-precipitated toxoid, developed clinical diphtheria 18 days after second dose, *mild* case, no complications, 54 days in hospital.

Case No. 2. Never Schick tested — *mild* case, 31 days in hospital.

Case No. 3. Schick positive — one dose of alum-precipitated toxoid, developed clinical diphtheria 3 weeks after first dose, *mild* case, no complications, 35 days in hospital.

Case No. 4. Schick sensitive — no toxoid, moderately severe clinical case, no complications, 29 days in hospital.

Case No. 5. Never Schick tested — severe case, 42 days in hospital.

Case No. 6. Schick positive — two doses of alum-precipitated toxoid, *mild* case, admitted *3½ months after last dose*, no complications, 22 days in hospital.

Case No. 7. Schick positive — two doses of alum-precipitated toxoid, *mild* case, admitted 5 months after last dose, no complications, 22 days in hospital.

Case No. 8. Schick "positive"— two doses of alum-precipitated toxoid, *mild* case, admitted 5½ months after last dose, no complications, 17 days in hospital.

Case No. 9. Schick "positive"— two doses of alum-precipitated toxoid, *mild* case, admitted 6 months after last dose, palatal paralysis, discharged as cured, 62 days in hospital.

In view of the high initial group diphtheria susceptibility (50 per cent) and the increase in the case incidence among civilians in Canada during 1942, the insignificant incidence of toxoid reactions and the infrequency of subsequent cases of diphtheria among Air Force personnel are sufficient demonstration of the practicability and value of this program to the Service.

Scarlet Fever.

It was expected that the introduction of routine Dick testing and scarlet fever immunization would effect a substantial reduction in the incidence of scarlet fever and its complications and would largely render wholesale interruptions of training, by quarantine, unnecessary. During the fourth quarter of 1941 and the first quarter of 1942, however, scarlet fever still ranked second to mumps in frequency and first in volume of hospital care among the acute infectious diseases. What then has been achieved?

In assessing the results of the scarlet fever program at this stage (June 1, 1942), two facts must be kept clearly in mind: (a) Only personnel read as Dick positive receive any scarlet fever toxin, and (b) immunization is not begun until after entry into Service (in most instances at "M" depots).

Limitations (technical or otherwise) imposed by the Dick test are important, since any difficulties or discrepancies in reading the Dick test, resulting in underestimating the number of those "susceptible", mean that a residual pool of susceptibles will not receive toxin. Early work suggested that 30 per cent of personnel might be found to be Dick positive (see above). When the program was put into general operation the proportion of individuals reported as positive ran as low as 10-12 per cent. Certain adjustments in technique and reading of the test have obviated much of the difficulty. Approximately 30 per cent of all tests are now read as positive. Scarlet fever *does* occur among Dick "negatives" but it is felt

that many (certainly *not all*) of the cases reported during the past eight months among individuals read as Dick negative may be accounted for on the basis of these factors.

Since the full course of inoculations requires five weeks to complete as a minimum, points of initial entry into the Service or units receiving personnel with less than two months' Service life will always have a large proportion of personnel still "susceptible" by our present standards of judgment. This limiting factor is of disproportionate importance in scarlet fever because of the ubiquitous nature of the infecting agent.

Recent Scarlet Fever Experience.

Two factors at least might have affected the incidence of scarlet fever among Service personnel during the period from October, 1941, to May, 1942, compared with the corresponding period in 1940-41. These are, first, year-to-year variations in the prevalence of the disease and, second, the scarlet fever immunization program.

There seems to be no good reason why, other things being equal, the year-to-year variations in scarlet fever incidence among civilians should not be paralleled by generally comparable variations among Service personnel in the same areas. Comparison between civilian experience (corrected for the inclusion of Service cases) and R.C.A.F. experience during the two periods is, therefore, instructive.

Excluding Air Force cases, the ratios of scarlet fever incidence during the thirteen weeks ending March 29, 1942, to that for the same period in 1941 were 1.6 for Canada and 0.6 for all Air Force personnel. The figures for Ontario and No. 1 Training Command (which corresponds closely in area with Ontario) were 1.9 and 0.5 respectively, a favourable ratio of 4 to 1 figure II).

COMPARATIVE SCARLET FEVER INCIDENCE
RATIO OF INCIDENCE—1942 TO 1941
FIRST QUARTER YEAR

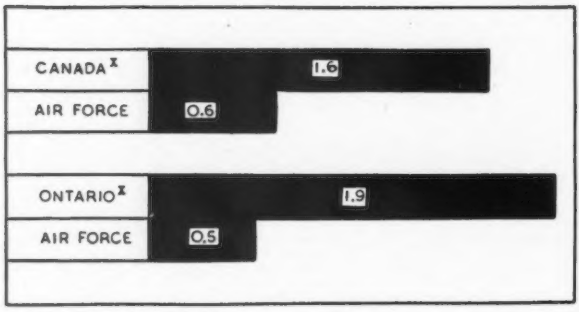

FIGURE II

Despite the fact that the incidence of scarlet fever in Ontario in 1942 was double that in 1941, the incidence among Service personnel was only half that for the previous year.

The trend in case incidence by weeks for all Air Force Commands combined and for No. 1 Training Command alone during the thirteen-week period ending March 29, 1941, compared with the corresponding period in 1942, is illustrated by figure III.

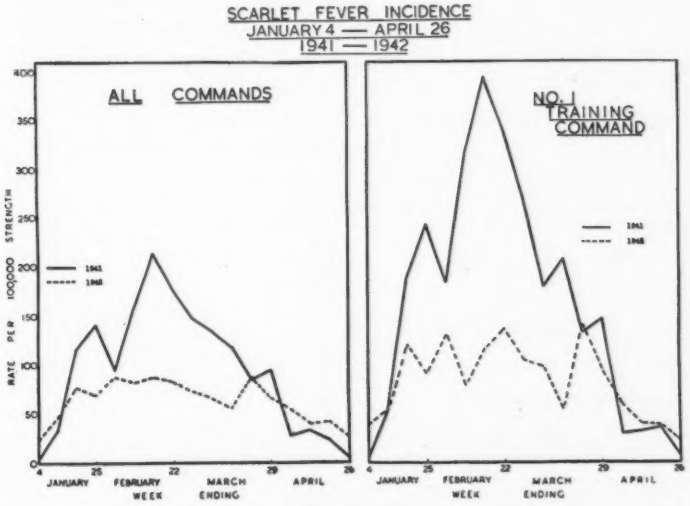

FIGURE III

More than 60 per cent of all cases have occurred either at points of initial entry or at training levels prior to the completion of the necessary inoculations in Dick "positives". More than half the balance has occurred among trainees not coming under the plan. Indeed, the incidence of scarlet fever among R.C.A.F. trainees has been less than half that among trainees of other Services who have not come within the scope of the program.

A review of 679 consecutive scarlet fever cases reported between October 1, 1941, and March 27, 1942, for whom Dick-test readings, dosage of scarlet fever toxin given to Dick "positives" and complications were available, shows that approximately two-thirds of the cases have occurred among personnel whose Dick test was read as negative. Reference has already been made to this point. A total of 225 cases occurred among Dick "positives". Of this number 54 developed the disease before receiving any toxin, and 128 had had three or fewer doses. Only 35 cases in this series had had five doses of toxin and of these, 7 developed the disease within four weeks of the last dose (18 after twelve weeks).

It is not possible to ascertain precisely the incidence of scarlet fever among those who have had five doses, three or fewer or no doses of toxin.

Estimates of relative incidence are as follows: Dick "positives" with no toxin* 27 per 1,000; Dick "positives" with three doses or less, 19; Dick "negatives", 6; and Dick "positives" with a complete series of inoculations, 4 per 1,000.

Despite a 50 per cent reduction in incidence (figures II and III), the volume of cases has been significant. It is, therefore, important to know whether the cases which have occurred have been milder on the whole, whether complications have been more or less frequent and whether interruption of the training program, such as was occasioned by other outbreaks, has been necessary.

The fact is that no significant interruption of training at any station has been found necessary. This is an important gain and while all of it cannot be attributed to the effects of the scarlet fever immunization program, a large measure of it can be.

Medical Officers report that complications have been much less frequent than formerly and severe cases markedly reduced. The incidence of complications (all types) among Dick "negatives" has run at 8 per cent compared with 3 per cent in Dick "positives" receiving scarlet fever toxin and 9 per cent in Dick "positives" who develop scarlet fever before having received any toxin.

Whooping Cough and Mumps.

Passing reference to whooping cough and mumps is of interest. About three-quarters of adults give a history of having had whooping cough but adult cases of whooping cough in the civil population are not at all uncommon. They form about one per cent of reported cases. Only one case has been recorded among R.C.A.F. personnel in the last eighteen months.

It has been estimated that over 60 per cent of individuals reaching age 18 have had an attack of mumps (18). The Service Medical Officer is inclined to doubt the veracity of this statement or the lasting nature of immunity to mumps following an attack. Mumps outbreaks are common in Service experience particularly where there are large aggregations of men. Control of the disease is difficult. The application of quarantine measures as ordinarily understood is not only essentially useless but quite impracticable. The main concern is to avoid as far as possible, transmission from one training unit to another. Vigilance, properly spaced contact observation, and close inter-unit medical liaison achieve more than does quarantine.

Troublesome as the disease is, its complication, orchitis, is more so. Service experience to date has been that 25 per cent of cases develop orchitis. Signs of involvement of the central nervous system have been present on occasion only.

The season peak for mumps among Air Force personnel in Canada has regularly been April and May in contrast to civilian experience in which the peak falls two months earlier.

*See footnote to page 579 re S.T.D.

COMMENTS

The health of personnel in the Royal Canadian Air Force has been and continues to be maintained at the highest level in respect to both general sickness and communicable disease. Success in this field may be attributed in a large measure to keen appreciation and application of the principles of preventive medicine in personnel maintenance. In respect to those diseases for which specific immunization is generally practised, the record of the Royal Canadian Air Force is remarkable. Under the immunization program, as recently broadened to include both diphtheria and scarlet fever, almost complete control of the former and sizable reduction of the latter appear to have been achieved.

Many epidemiological problems remain to be solved — mumps and rheumatic fever are outstanding examples. Service experience will undoubtedly contribute a great deal toward our knowledge of control in such diseases, but it is to the army of research workers in the laboratory and in the field that the Armed Forces must look for guidance.

ACKNOWLEDGMENT

It is desired to acknowledge the work of the Command Hygiene Officers, Medical Officers at all units, and many others, in supplying the information upon which the observations herein presented have been based.

It is desired to place on record at this time also, acknowledgment of the valuable and ready assistance and co-operation afforded the R.C.A.F. Medical Branch by Provincial and Muncipal Health Departments throughout Canada. Much is to be gained mutually by this liaison, particularly under war-time conditions and a continuance of the present measure of collaboration is therefore of fundamental importance.

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Individual Variation in Immunity*

Variance of Antitoxic Response in Guinea Pigs Inoculated with Diphtheria Toxoid

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DURING the course of the extensive research on diphtheria immunization procedures, investigators have been concerned principally with the selection of a suitable antigen, the dosage, and the interval between injections. Little study has been made of the great variation in the individual antitoxic esponse following injections of diphtheria antigens. The individual response to a diphtheria antigen may even vary enough to cause a difference in the *average* antitoxic titres of groups under observation. Such a condition influencing results might be the reason for the conflicting reports in the literature, e.g., Faragó (1) found an average of 93.5 per cent of children Schick negative following a single inoculation of 1 cc. of alum precipated toxoid. Benning (2), on the other hand, found only 71.5 per cent negative following the same treatment. Investigators have failed to explain the wide variance in their reports.

There are two factors which have defeated efforts to control diphtheria immunization studies. First, many artificially immunized persons under observation have, through contact with diphtheria carriers, shown increased antibody titre. This may partially account for the conflicting reports. However, in evaluating diphtheria immunization methods, many have overlooked a second extremely important influence, namely, the ability of individuals to respond in varying degrees to this antigen. There is a factor inherent in each individual which determines antitoxic response irrespective of other variables. If a number of individuals of the same species, sex, and weight, living under apparently similar conditions, are stimulated with equal injections of the same antigen, they will not produce the same antibody titre.

EXPERIMENTAL

In order to determine the magnitude of this individual factor, we have made a study of the individual antitoxic potencies of serums from twenty-two guinea pigs following two 1-cc. injections of fluid diphtheria toxoid.

Selection of Animals.

To avoid the interference of the diphtheria carrier, guinea pigs were selected for the study. Unlike human beings, they have no so-called "carriers" which might distort the antitoxic potency curves. In choosing

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the animals for this experiment, care was taken to control the test in every possible way so that the individual response could be studied without the interference of other factors. Healthy male pigs of the same breed, weighing between 300 and 330 Gm. were selected, kept in the same environment and given the same food.

Antigen.

Regular diphtheria fluid toxoid (Lilly No. 951128) containing 22 flocculation units per cubic centimeter was used as an antigen.

Immunization.

The guinea pigs were immunized by two 1-cc. subcutaneous injections of the fluid toxoid with a thirty-day interval between injections.

Serum Titration.

At intervals of one month following the second injection, each pig was bled intracardially. Four cc. were taken at each bleeding. The blood was allowed to clot at room temperature, the clot was then loosened and, after further standing in the refrigerator or centrifuging, the serum was decanted.

Each serum was titrated separately for diphtheria antitoxin potency by intracutaneous tests on rabbits, using a modification of the test reported by Fraser (3). This was the same procedure as previously reported by Jones and Moss (4). Since it was not advisable to test at extremely close levels, a scale of potencies was chosen which included 0.002, 0.005, 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1.0, 2.0, 3.0, and 5.0 units.

Table 1 shows the antitoxic titre of the serums from each guinea pig, at monthly intervals, over a period of six months following the second injection of toxoid.

Owing to the death of a number of the guinea pigs, either because of intercurrent diseases or because they were unable to withstand numerous bleedings, the table is not complete.

As may be observed by studying table 1, the antitoxin titres cover a wide range. One month following immunization, two pigs exhibited a potency of 3.0 units of diphtheria antitoxin per cubic centimeter, as contrasted to one pig which tested only 0.01 unit; i.e., one pig responded with three hundred times the antitoxin production of another, similarly treated.

Chart 1 represents graphically the diphtheria antitoxin curve of each serum. Each line indicates the rise and fall in the potency of the blood serum from one pig. At one month there are more lines passing through the 1.0 unit level than any other; therefore theoretically all lines should have followed this level. Five other pigs which were above or below this level may be considered as satisfactory. This leaves approximately one-third of the group which did not reach a satisfactory level. A large part of this lower group might be compared with human subjects who may give negative Schick tests one or two months following immunization treatment and then revert to Schick positive a short time later.

TABLE I

IMMUNIZATION OF GUINEA PIGS AFTER TWO 1-CC. INJECTIONS OF FLUID TOXOID

Guinea Pig No.	*Weight*	*Units of Diphtheria Antitoxin after—*					
		1 mo.	*2 mo.*	*3 mo.*	*4 mo.*	*5 mo.*	*6 mo.*
9001	320 gm.	0.5	0.2	0.2	—	—	—
9002	305	0.2	0.2	0.2	—	—	—
9003	325	3.0	1.0	1.0	1.0	—	—
9008	310	1.0	0.5	0.5	—	—	—
9009	310	0.01	0.01	0.01	—	—	—
9010	330	0.5	0.2	0.2	0.2	0.1	0.05
9011	325	0.1	0.1	0.1	0.1	0.1	0.05
9012	310	1.0	1.0	1.0	1.0	1.0	0.5
9013	305	0.5	0.2	0.2	0.2	0.2	0.2
9014	300	1.0	0.5	0.5	0.5	0.5	0.5
9016	305	0.1	0.1	0.1	0.1	0.1	0.1
9017	325	0.2	—	—	—	—	—
9018	300	1.0	—	—	—	—	—
9020	310	0.1	0.05	—	—	—	—
9021	300	0.1	0.1	0.1	0.01	0.01	—
9022	310	0.2	0.2	0.2	0.2	0.2	0.2
9023	310	3.0	2.0	2.0	1.0	1.0	1.0
9025	310	1.0	0.5	0.5	0.2	0.1	0.1
9027	305	1.0	0.5	0.2	—	—	—
9028	320	1.0	1.0	1.0	1.0	0.5	—
9029	305	0.05	0.05	0.05	0.05	—	—
9030	315	1.0	0.5	0.5	0.5	0.5	—
Average		.753	.445	.450	.439	.367	.300

Charts 2, 3, 4 and 5 show the percentage distribution of the guinea pigs at the various potency levels at intervals of one, two, four, and six months after the second injection of toxoid. Each column represents a definite potency level. The height of the column is determined by the percentage of serums testing that particular titre.

At one month (chart 2) 9 per cent of the entire group tested at 3.0 units of diptheria antitoxin per cubic centimeter of serum, 43.6 per cent tested at 1.0 unit, 13 per cent tested at 0.5 unit, at 0.2 unit, and also at 0.1 unit; and 4.2 per cent tested at 0.05 unit and at 0.01 unit; 82.3 per cent of

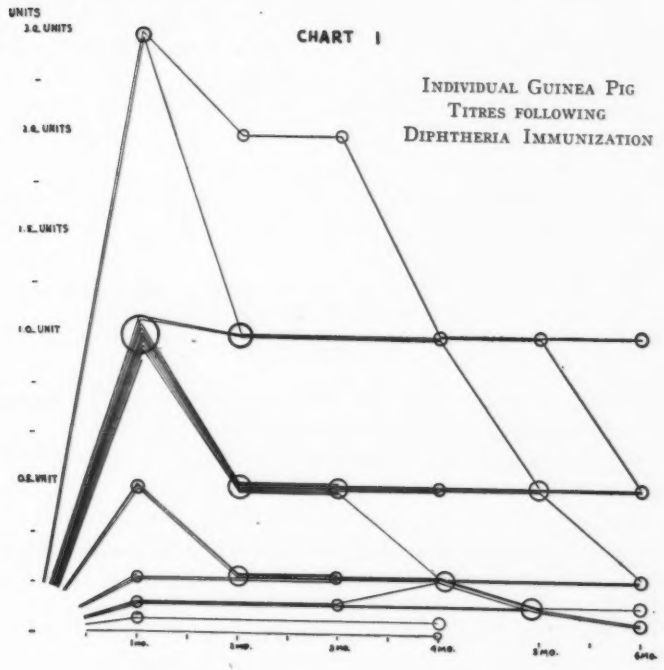
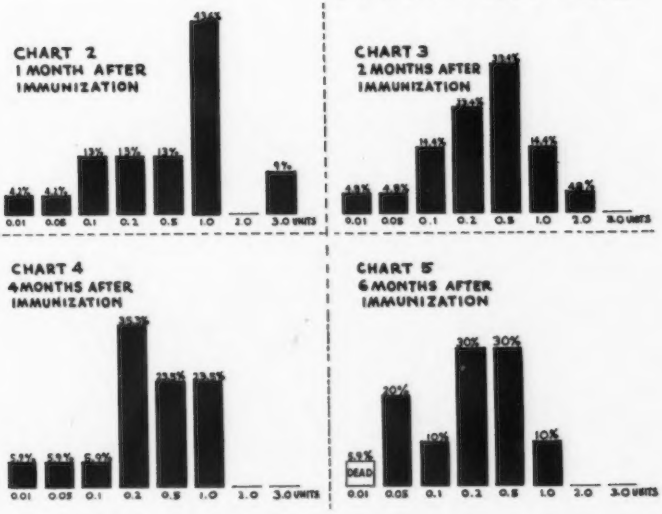


CHART 1

INDIVIDUAL GUINEA PIG TITRES FOLLOWING DIPHTHERIA IMMUNIZATION

PERCENTAGE DISTRIBUTION OF GUINEA PIGS AT VARIOUS POTENCY LEVELS



the entire group were between 0.1 and 1.0 unit, inclusive. Similar explanations may be made for charts 3, 4, and 5. As the interval following immunization increases, the average titre of the group gradually decreases. The tendency for the potencies to approach the same level is apparent.

Conclusions

1. Individual diphtheria antitoxin response, as determined by titrations of blood serums from guinea pigs immunized with two 1-cc. injections of fluid diphtheria toxoid, was studied.

2. The difference in potencies due to variation in individual response was greatest immediately following immunization.

3. Those individuals which deviated greatly from the average were in the minority.

4. As large groups as possible should be observed in attempting to evaluate efficacy of different diphtheria antigens in order to reduce the individual variation factor to a minimum.

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The Incidence of Trichomonas Vaginalis in Clinic Patients at the Women's College Hospital, Toronto

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Trichomonas vaginalis was described by Donne (1) in 1836 but little attention was given to the parasite until the last two decades. There is still a controversy concerning the differentiation of the trichomonads inhabiting the vagina, intestine and mouth. Morphologically they are much alike though considerable variation in shape and size occurs in each species and even in the same sample of material. The oral and intestinal trichomonads have been considered non-pathogenic whereas the pathogenicity of *T. vaginalis* has been a subject of considerable dispute. Moench (2) suggests that *T. vaginalis* is a harmless visitor and the organism probably enters the vagina from the intestinal tract. Many investigators relate the organism to vaginal discharge, others suggest that a symbiosis of *Streptococcus* and *T. vaginalis* is essential to produce clinical symptoms. Rodecurt (3) found in a series of patients with discharge that 88 per cent of those examined had *T. vaginalis*. Karnaky (4) concluded from experiments in which *T. vaginalis* and various bacteria, usually associated with *T. vaginalis*, were inoculated into the vagina, that the trichomonads alone produced the pathological symptoms observed. Trussell (5) also produced pathological changes in patients by the transplanting of *T. vaginalis*. Liston (6) suggests that a suitable pH of the vaginal contents is important for the development of *T. vaginalis*. In his opinion clinical symptoms appear only when the parasites have established themselves and are multiplying freely. He found that the optimum pH for the multiplication of *T. vaginalis* ranged around 6. Stabler et al (7) report negative results following attempts to implant cultures of *T. hominis* in the vaginas of 50 women but implantations of cultures of *T. vaginalis* established themselves in a number of cases. Bland and Bakoff (8) examined 200 women for the presence of vaginal, intestinal and mouth trichomonads and found the incidence of vaginal trichomonads to be 23.5 per cent, mouth trichomonads 16.5 per cent, and intestinal trichomonads 1.5 per cent.

The present survey gives the results of examination of 300 women for *T. vaginalis*. This includes a group of women from whom cervical, rectal and mouth swabs were taken. A sample of blood from a number of patients was examined in order to disclose whether or not trichomonads were present in blood.

MATERIAL AND METHODS

The material for this survey was obtained from the patients attending different clinics at the Women's College Hospital, Toronto. Most of these were residents of the city; only 9 came from outside of Toronto. Cervical swabs were taken from 300 patients. In addition rectal and mouth swabs were taken from 96 of the 300 patients, and a sample of blood was obtained from 58 patients. The cervical material from 86 women of the 300 was cultured on sheep blood-agar plates.

The swabs were taken by members of the staff of the Women's College Hospital and were transferred into culture media or in some cases into test tubes containing about 2 cc. of saline. The material was taken to the laboratory of the Department of Hygiene and Preventive Medicine, University of Toronto, two or three hours after it was collected. The specimens were then submitted to microscopical examination before the culture tubes were transferred to the incubator.

Fresh Preparations

This is the quickest way to detect the presence of trichomonads. A drop of fluid is transferred to a warm slide, covered with cover-slip and examined under low power or, if necessary, high power. Trichomonads, when present, are easily recognized under low power by their motility. The addition of a drop of saline tinted with safranine, as advised by Liston (6), is helpful in differentiating quiescent and rounded-up trichomonads from pus cells. The pus cells take up the dye, whereas trichomonads remain unstained and appear as refractile, greenish bodies. Blood cultures, as well as the material from rectal and mouth swabs, were similarly submitted to the direct examination before they were incubated.

Stained Preparations

The smears were prepared by passing the swab gently over the surface of a clean, warm slide which was then dried in the air. Several staining methods were used but the best results were obtained with Leishman's stain as used by Liston (6). This method is valuable because the smear can be prepared when the patient is examined and the dry smear can be stained and examined any time afterwards. The unstained slides can also be sent to the laboratory for staining and examination. The stain was used as follows: About 10 drops of the stain were dropped on the smear and allowed to remain for one minute. Then about 20 drops of distilled water were added, drop by drop, and the stain and water were thoroughly mixed by drawing the mixture into the pipette and forcing it out several times. The smear covered with the diluted stain was allowed to stand for ten to fifteen minutes. The stain was then washed off with distilled water and the smear was allowed to dry in the air. When dry a drop of Canada balsam was added and the smear covered with a cover slip. Trichomonads stain a light blue colour and the oval nucleus at the anterior end of the body

stains reddish-purple. Some specimens may show the flagella, undulating membrane or axostyle.

Cultures

The culture medium used by Frye and Meleney (9) for *Entamoeba histolytica* was chiefly used. Liver extract for this purpose was kindly provided by Dr. E. W. McHenry, Connaught Laboratories. *T. vaginalis* was grown in this medium over relatively long periods of time and with varying success. However, it did not thrive in this medium as well as *E. histolytica*. Other media were used also but proved less satisfactory. The swabs were left in the culture tubes for three to four hours, occasionally overnight. All negative cultures were subcultured once after twenty to twenty-four hours and examined daily for the following four days. The culture method is, however, hardly necessary for diagnostic purposes as a fresh smear examination will usually reveal all cases of vaginal trichomonads. If the smear is negative or doubtful, and yet the abnormal appearance of the material is suggestive of trichomonads, a second smear should be examined after a period of time.

Results of the Examination:

Cervical specimens: Cervical swabs from 300 women, attending different clinics, showed *T. vaginalis* in 112 cases, or 37 per cent. Most of the patients who had *T. vaginalis* had complained of vaginal discharge. More patients in this series, however, had discharge but showed no trichomonads. Table 1 gives the incidence of *T. vaginalis* in patients at the different clinics as well as the correlation of *T. vaginalis* with the discharge.

TABLE I

THE INCIDENCE OF *Trichomonas vaginalis* AND ITS CORRELATION WITH DISCHARGE IN 300 OUTPATIENTS AT THE WOMEN'S COLLEGE HOSPITAL

Clinics	Number examined	Infected with *T. vaginalis*				Discharge without *T. vaginalis*
		Number	Per cent	Discharge	No Discharge	
Gynaecological	111	33	30	27	7	44
Special	95	58	61	53	4	30
Obstetrical	61	13	21	13	..	26
Post-natal	28	6	21	6	..	14
Medical, Surgical	5	2	..	2	..	3
Total	300	112	37	101	11	117

The highest incidence, 61 per cent, was found in women attending the special clinic for the treatment of gonorrhoea or syphilis. The lowest incidence, 21 per cent, occurred in patients of the obstetrical and postnatal clinics. The patients at the gynaecological clinics showed an incidence of 30 per cent. The number of patients examined at the medical and surgical clinics is too small, and the occur-

rence of trichomonads in these women cannot be taken as representative for the group.

Vaginal discharge was associated with *T. vaginalis* as follows: both discharge and *T. vaginalis* occurred in 101 instances and in 11 instances *T. vaginalis* was present, although no discharge was recorded. In 117 cases a discharge was present without *T. vaginalis*.

One swab was taken per patient in most cases. The number of positive cases would probably have been higher if more swabs had been taken. Two swabs were taken from 28 patients. These included six women whose first swab was negative and the second positive. The interval between the first and second swab varied from one week to two months. Of 112 positive cases only four did not show trichomonads on the fresh preparation. One of the four cases showed no trichomonads on the fresh nor on the stained smear. Three cases were doubtful on fresh preparations but showed the organisms on the stained films. All four cases showed trichomonads on the second and third day in cultures. It is probable that fresh smears of these would have shown trichomonads had they been examined immediately after the swabs were taken. It is also probable that very few organisms were present in these samples which might have escaped detection in the direct examination of the diluted material.

T. vaginalis was frequently found in patients who had gonorrhoea or syphilis or both. These findings are shown in table 2.

TABLE 2

THE OCCURRENCE OF *Trichomonas vaginalis* IN PATIENTS WITH GONORRHOEA AND/OR SYPHILIS

Cases	Number examined	*T. vaginalis*	
		Present	Absent
Gonorrhoea	46	25	21
Syphilis	17	11	6
Syphilis and Gonorrhoea	32	22	10

The ages of the patients examined ranged from 14 to 65 years. The oldest patient infected with *T. vaginalis* was 48 years old and the youngest 14. The incidence rate in various age groups of single and married women is shown in table 3.

Table 3 shows that of 300 patients examined 230 were married and 71, or 31 per cent, of these had *T. vaginalis*. Of 70 single women examined 41, or 58 per cent, were infected with *T. vaginalis*. The highest incidence, 62 per cent, occurred in single women in the age group of 14 to 20 years and the lowest incidence, 28 per cent, in the married women of the same ages. The high incidence among single women is not surprising considering the fact that most of these were attending the special clinic for gonorrhoea or syphilis; the rest were patients of the gynaecological or obstetrical clinics who either were pregnant or had had one or two pregnancies. In the age group of 41 to 50 years the number examined is too small to allow of taking the results as representative of

TABLE 3

THE INCIDENCE OF *Trichomonas vaginalis* IN 300 SINGLE AND MARRIED WOMEN IN VARIOUS AGE GROUPS

Age Groups	Number of cases examined	Married			Single		
		Number examined	Infected with *T. vaginalis*		Number examined	Infected with *T. vaginalis*	
			Number	Per cent		Number	Per cent
14-20	62	25	7	28	37	23	62
21-30	126	100	29	29	26	15	60
31-40	74	69	22	32	5	2	40
41-50	32	30	13	43	2	1	..
51-65	6	6	..	..	..	..	..
Total	300	230	71	31	70	41	58

the incidence rate. Of the 300 women examined 76 were pregnant and 24, or 32 per cent, had *T. vaginalis*.

Mouth and Rectal Specimens

Several authors have expressed the opinion that the mouth and intestinal trichomonads have the ability to establish themselves in the vagina. Cervical, rectal and mouth swabs were, therefore, taken of 96 patients in order to find any correlation between the 3 species of *Trichomonas* in the same individual. These results are shown in table 4.

TABLE 4

THE INCIDENCE AND CORRELATION OF THE THREE SPECIES OF *Trichomonas* ON THE CERVICAL, MOUTH AND RECTAL SWABS OF 96 WOMEN

Number of cases	*T. vaginalis*	*T. tenax*	*T. hominis*
29	+	−	−
2	+	−	+
2	−	−	+
1	−	+	−
62	−	−	−

Trichomonas hominis was found in 4 cases and *T. tenax* on one occasion. Two patients had both *T. vaginalis* and *T. hominis*; two had *T. hominis* only, and 29 patients had *T. vaginalis only*. No patient examined had trichomonads in all three sources studied. Our present findings concerning *T. hominis* are in accordance with the results of previous surveys by one of us (10, 11). In these surveys, 4 patients out of 324 examined in the Toronto Western Hospital and 3 out of 438 examined in the Hospital for Sick Children had *T. hominis*. The rare occurrence of trichomonads in the mouth and rectum of the patients infected with *T. vaginalis* suggests that the mouth and rectum are probably not the sources of *T. vaginalis*, as otherwise a closer correlation would have existed between trichomonads from a different location in the same host.

Blood Specimens

Blood samples from 58 patients were examined and cultured but in no case were trichomonads found. Seventeen of the 58 had *T. vaginalis* and 41 were free of it. Wagner and Hees (12) reported that they found trichomonads not only in the vagina but in stools, blood, urine and elsewhere. Such findings have not been recorded by other workers. Liston (6) refers to these findings with hesitation and suggests that some other trichomonads may have contaminated the films or cultures used by these workers. Schultz and Westphal (13) cultured the blood of 100 women infected with *T. vaginalis* but in no case did they find trichomonads in blood. Our results are in agreement with these findings.

Blood-agar plates

The material from cervical swabs of 86 patients was transferred to blood-agar plates. The following organisms were found: *Staphylococcus albus, aureus* and *citreus; Streptococcus haemolyticus, viridans* and *inert; Bacterium coli,* Gram positive bacteria and spore-bearing bacteria. These occurred either singly or in combination with others. Four patients had *Streptococcus haemolyticus*; 2 of these had *T. vaginalis* and the other 2 showed no trichomonads. Similar conditions were found to exist in other cases: various bacteria were present with *T. vaginalis* as well as in the absence of the latter. No apparent relationship was found between the species of organism isolated and the presence or absence of *T. vaginalis.*

Treatment

The patients were treated for *T. vaginalis* with an insufflation of powder containing the organic arsenical compound *Stovarsol.* This was followed by the insertion of pills of the same substance at night. *Stovarsol* was found to be superior to gentian violet and other drugs used earlier in the Women's College Hospital.

We have been unable to follow the results in all patients treated during this survey. A number of patients, however, have returned to the clinics once or several times. One to 5 post-treatment swabs had been taken from 36 patients. The swabs of 5 of these were still positive for *T. vaginalis* after a period of from one to three months had elapsed since the first examination. The swabs from 31 patients no longer showed trichomonads. These patients were examined by taking two to five swabs over a period of from one week to three months. Their condition had improved and the discharge had disappeared. In addition to these 36, many other cases were clinically cured, but no more swabs were taken.

SUMMARY

1. *T. vaginalis* was found in 112 cases, or 37 per cent, in 300 clinic patients at the Women's College Hospital, Toronto.

2. The incidence was 61 per cent in patients attending the special clinic, 30 per cent in those attending the gynaecological clinic and 21 per cent in patients at the obstetrical and post-natal clinics.

3. *T. vaginalis* was associated with discharge in 101 instances and present without discharge in 11 instances. In 117 cases the patients had discharge without *T. vaginalis*.

4. *T. vaginalis* was found in 25 out of 46 patients having gonorrhoea, in 11 out of 17 having syphilis, and in 22 out of 32 having both syphilis and gonorrhoea.

5. The ages of the patients examined ranged from 14 to 65 years. No *T. vaginalis* was found in patients over 48 years of age.

6. *T. vaginalis* was present in 24, or 32 per cent, of 76 pregnant women examined.

7. Cervical, rectal and mouth swabs from 96 patients showed *T. hominis* in 4 cases, *T. tenax* (buccalis) in 1 case and *T. vaginalis* in 31 cases. Two women had both *T. vaginalis* and *T. hominis*; 2 had *T. hominis* only and one had *T. tenax* only.

8. Blood samples from 58 patients examined revealed no trichomonads.

9. Cervical material from 86 patients, cultured on blood-agar plates, showed various bacteria. No correlation, however, was found to exist between these organisms and the presence or absence of *T. vaginalis*.

10. *Stovarsol* was used in the treatment of *T. vaginalis* and was found to be effective.

ACKNOWLEDGMENTS

The authors wish to thank Dr. Donald Fraser, Professor of Hygiene and Preventive Medicine, University of Toronto, for directing this survey and helping in the preparation of the manuscript and the staff members of the Women's College Hospital for their kind assistance in obtaining the material.

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THE BEVERIDGE REPORT—A STIMULUS TO CANADIAN THINKING

SIR WILLIAM BEVERIDGE is internationally known as an economist. As Master of University College, Oxford, he has continued to add to his reputation and he speaks with an authority gained not only in academic fields but in the Civil Service, in which he served for twenty years.

Measures for social security have been progressively developed in Great Britain since the introduction of unemployment insurance and national health insurance by Lloyd George thirty years ago. Canadians are familiar, too, with the developments in the United States, where under the Federal Security Agency is grouped the administration of insurance and other social welfare measures, education, and the United States Public Health Service. Social security is a term with which we are becoming increasingly familiar. Sir William's definition of this term is "the securing of an income to take the place of earnings when they are interrupted by unemployment, sickness or accidents, to provide for retirement through old age, to provide against loss of support by another person, and to meet exceptional expenditures such as those connected with birth, death, or marriage." The report is based on three assumptions: "(1) children's allowances for children up to the age of 15 or, if in full-time education, up to 16; (2) comprehensive health and rehabilitation services for the prevention and cure of disease and the restoration of the capacity for work available to all members of the community; (3) maintenance of employment, that is to say, avoidance of mass unemployment." In Canada, with the cooperation of the Provincial Governments the Federal Government has provided old-age pensions for persons attaining the age of seventy years. Unemployment insurance has been recently established as a national measure. It is generally known that an intensive study of health insurance is being made by the Federal authorities.

Without question the Beveridge report will constitute a stimulus to Federal and Provincial Governments alike in their planning, particularly for post-war reconstruction. It is probable that the Beveridge plan would not fit readily into the Canadian program but it is certain that the basic premises of adequate security for every individual must be the objective of the post-war years. This security must rest on the health of our people, which in turn must be safeguarded and improved through the provision of adequate medical, dental, and nursing care.

ASSOCIATION NEWS

Examinations for the Certificate in Sanitary Inspection (Canada)

THIS year's examinations for the Certificate in Sanitary Inspection (Canada), conducted by the Canadian Public Health Association, were held in six centres—Vancouver, Edmonton, Regina, Winnipeg, Toronto, and Montreal—on September 9, 10 and 11. Thirty-one candidates completed the requirements governing registration, and with but one exception all were successful in the examinations. The successful candidates are as follows:

British Columbia: Robert Herbison, Vancouver.

Alberta: *Lloyd G. Alexander,* Edmonton. Norman Lewis Bruce, Calgary. Clarence John Eastwood, Calgary.

Saskatchewan: Charles Cecil Beaton, Prince Albert. Herbert Thomas Reginald Bethell, Regina. Thomas Allen Cherry, Regina. John Albert Murray, Regina. Arthur Perry, Regina. Walter James Pym, Regina.

Manitoba: Nicolas Donald DuBick, Winnipeg. William Kempa, Winnipeg. June Lawson, Winnipeg. Isaac Peters, Winnipeg. Olafur Bjorn Petursson, Winnipeg. Edward Johnstone Rigby, Winnipeg.

Ontario: John Fielding Blacklock, Hamilton. James Drummond, St. Thomas. Alexander Ewen Grant, Brockville. James Walter Sutherland, Toronto.

Quebec: Eudore Beaulieu, Chicoutimi. Roland Lafond, Rosemount. Jean-Louis Laliberté, Montreal. Georges Lambert, Granby. Léopold Massé, Montreal. Leo Noël, Montreal. Jean Paquin, St. Eustache. Marcel Picard, L'Epiphanie. Charles Pilotte, Montreal. Jacques Saint-Georges, Montreal.

Including these candidates, the Canadian certificate has been granted to two hundred and sixty-seven inspectors since the introduction of the examinations in 1935. Miss June Lawson of Winnipeg, one of this year's candidates, is the first woman to obtain the certificate.

As in past years, the responsibility for the conduct of the examinations was left with the Provincial Departments of Health, the Deputy Minister of which appointed the chairman of the provincial examining board. The second member was chosen by the chairman, and the third was nominated by the Canadian Institute of Sanitary Inspectors. The Committee on the Certification of Sanitary Inspectors gratefully acknowledges the cooperation of the following members:

British Columbia: Dr. Stewart Murray (chairman), Mr. A. E. Gordon and Mr. G. A. Rogers.

Alberta: Mr. D. B. Menzies (chairman), Dr. G. M. Little and Mr. J. Butterfield.

Saskatchewan: Mr. J. G. Schaeffer (chairman), Dr. George Walton and Mr. M. H. Kennedy.

Manitoba: Dr. C. R. Donovan (chairman), Mr. W. D. Hurst and Mr. James Arkle.

Ontario: Dr. J. G. Cunningham (chairman), Dr. R. D. Defries and Mr. Hugh McIntyre.

Quebec: Mr. Théo. J. Lafrenière (chairman), Dr. Adelard Groulx and Mr. Aimé Cousineau. In addition, Dr. A. J. G. Hood assisted in the oral examinations.

The examination papers in the three written subjects were as follows:

SANITATION

(Thursday afternoon, September 10th)
Time: 3 hours

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1. (*a*) What are the most important features of good housing?

(*b*) In making the inspection of a lodging house, what are the various points of importance which you would note?

(*c*) What authority has an inspector in regard to lodging houses under the Public Health Act of your Province?

2. In making an inspection of the following premises, enumerate the various points which you would consider of importance in deciding whether these are suitable for the type of business it is proposed to carry on:

(*a*) A meat store.

(*b*) A barber shop.

(*c*) A restaurant.

(*d*) A rag, bone and scrap yard.

3. (*a*) What are the essential features of a septic tank? Illustrate with a sketch. In what way does a septic tank differ from a cesspool?

(*b*) What effect has an efficient septic tank on domestic sewage?

(*c*) What precautions are necessary to ensure satisfactory action in a septic tank receiving large quantities of kitchen waste?

(*d*) What is the function of the disposal bed, and how does it work? What is the reason for giving the bed periods of rest?

4. (*a*) In investigating the lighting conditions in a factory, what points should be observed:

(*b*) How may uneven or improper lighting affect the health of industrial workers or pupils in a school?

(*c*) What is meant by "foot candle" in referring to light?

5. (*a*) Name three types of wells.

(*b*) Outline how you would proceed to make an inspection of a well.

(*c*) What examinations of samples of well water are commonly made in the laboratory?

(*d*) Describe the steps which you would take in disinfecting a well which has been found to be contaminated.

6. Write notes on:

(*a*) A practical method for the chlorination of small quantities of water.

(*b*) Sources of objectionable tastes and odours in water.

(*c*) Advantages and disadvantages of a chemical toilet.

FOOD CONTROL AND LEGISLATION

(Friday morning, September 11th)
Time: 3 hours

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1. (*a*) Why should food displayed for sale in stores be protected against flies and other sources of contamination, including unnecessary handling by customers?

(*b*) Outline how foodstuffs may be protected from flies and how the other sources of contamination may be prevented.

(*c*) Name three communicable diseases which may be transmitted through food and explain how contamination may occur in each instance.

2. (*a*) What are the responsibilities of the Dominion Government in the field of public health? What is the name of the department in the Dominion Government which is concerned with public health?

(*b*) What are the responsibilities of a Provincial Department of Health? In what Act are these responsibilities outlined?

(*c*) What are the responsibilities of the local or municipal department of health? In what Act are these presented?

3. (*a*) Describe briefly a cockroach, a bed bug, and a louse, indicating size, appendages, color, and other physical characteristics.

(*b*) Outline a practical method for controlling cockroaches in a restaurant.

4. Outline the procedures which should be carried out in a milk pasteurization plant to assure proper pasteurization and the delivery of safe milk, tracing the milk from its reception at the plant to its delivery at the customer's home. To what points would you particularly direct your attention as a milk inspector?

5. (*a*) What diseases may be transmitted through improperly washed eating utensils?

(*b*) How would you proceed to determine the effectiveness of the dish-washing procedures in a restaurant?

(*c*) Outline the minimum requirements for dish-washing in small restaurants.

6. Write notes on:

(*a*) The essentials of a sanitary milk-house.

(*b*) Conditions calling for the condemnation of part or the whole of a carcass.

(*c*) Food poisoning from cream-filled confections.

PREVENTION AND CONTROL OF COMMUNICABLE DISEASES AND RELATED SUBJECTS

(Friday afternoon, September 11th)
Time: 3 hours

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1. An outbreak of typhoid fever has occurred in a temporary camp of berry-pickers. The dwelling places are tents or rough tar-paper shacks. There are two temporary stores and eating houses.

(*a*) What investigation should be made to discover the source of the infection?

(*b*) What action should be taken to prevent the spread of infection?

(*c*) What sanitary measures would you suggest to prevent the recurrence of such an outbreak, and to safeguard those eating the raw berries?

2. (*a*) What characteristics are common to all communicable diseases?

(*b*) What are the sources of any communicable disease?

(*c*) How may the infective agent leave the body? How does this factor influence the mode of transmission? Illustrate your answer to (*b*) and (*c*) by reference to three diseases.

3. (*a*) On what are the periods of isolation and quarantine based?

(*b*) State the quarantine and isolation periods as prescribed in your Province for the following diseases: scarlet fever, smallpox, poliomyelitis, whooping cough, and diphtheria.

4. Outline the steps which would be taken following the reporting of:

(*a*) A case of scarlet fever in a rooming house.

(*b*) An "open" case of tuberculosis in a restaurant kitchen staff.

(*c*) A case of poliomyelitis in a private home.

5. Write notes on:

(*a*) Vaccination against smallpox.

(*b*) Calculation of the crude death rate (with example).

(*c*) Fumigation with hydrocyanic acid gas.

ELEVENTH ANNUAL CHRISTMAS MEETING

LABORATORY SECTION

CANADIAN PUBLIC HEALTH ASSOCIATION

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ROYAL YORK HOTEL, TORONTO

DECEMBER 17-18, 1942

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PROGRAM FOR THURSDAY MORNING

Library, 9.30

Registration.—A fee of $1.00 is being charged to cover in part the expenses of the meeting.

Preparation and Standardization of P. P. D. Johnin. C. W. McINTOSH and H. KONST, Division of Animal Pathology, Science Service, Dominion Department of Agriculture.

A Complication of a Blood Transfusion. J. WYLLIE, Department of Preventive Medicine, Queen's University, Kingston.

Dilution Method for in vivo Titration of Diphtheria Toxoid. C. SIEBENMANN, Connaught Laboratories, University of Toronto.

Verification Tests. E. L. BARTON, Division of Laboratories, Department of Health of Ontario.

Serologic Types of Haemolytic Streptococci in Scarlet Fever in Ottawa. E. T. BYNOE, Laboratory of Hygiene, Department of Pensions and National Health, Ottawa.

The Biological Assay of Tetanus Toxoid. (Part I.) L. GREENBERG and J. GIBBARD, Laboratory of Hygiene, Department of Pensions and National Health, Ottawa.

Observations on the Preparation of Cholera Vaccine. L. E. RANTA and C. E. DOLMAN, Connaught Laboratories (Western Division), Vancouver.

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THURSDAY AFTERNOON

Program of Demonstrations

School of Hygiene, University of Toronto, 2.30

Cultural Medium for Gonococcal Organisms. N. A. LABZOFFSKY and A. MILLER, Division of Laboratories, Department of Health of Ontario.

Cultural Medium for the Isolation of Meningococci. JAMES BELL and A. MILLER, Division of Laboratories, Department of Health of Ontario.

Halo Formation round Colonies of H. influenzae, Type B. NELLES SILVERTHORNE, Connaught Laboratories, University of Toronto.

Hynes' Stool Culture Medium. FRED SMITH, Department of Bacteriology and Immunity, McGill University, Montreal.

Influenza Vaccines. RONALD HARE, Connaught Laboratories, University of Toronto.

Methods of Tissue Culture. RAYMOND C. PARKER, Connaught Laboratories, University of Toronto.

Reclamation of Agar. HILDEGARDE MACMORINE, Connaught Laboratories, University of Toronto.

Red Cell Deterioration Caused by Substances of the Thiazin Group. C. SIEBENMANN, Connaught Laboratories, University of Toronto.

The Use of the Waring Blendor to Separate Small Parasites from Tissues. A. M. FALLIS, Ontario Research Foundation, Toronto.

Verification Tests. E. L. BARTON, Division of Laboratories, Department of Health of Ontario.

Refreshments will be served in room 54 from 3.45 to 4.30.
Please arrange to be there before 4.30.

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THURSDAY EVENING

Informal Dinner

Private Dining Room No. 9, 6.30

Speaker: G. B. REED

Professor of Bacteriology, Queen's University.

"The Use of the Sulphonamides in Wounds"

Nomination of Officers.

Tickets ($1.75) will be on sale at the Registration Desk on Thursday morning and in the Enquiry Office of the School of Hygiene Thursday afternoon.

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FRIDAY MORNING

Private Dining Room No. 9, 9.30

Hynes' Stool Culture Medium. FRED SMITH, Department of Bacteriology and Immunity, McGill University, Montreal, Quebec.

Four Sporadic Cases of Infection due to Salmonella bareilly. J. WYLLIE, Department of Preventive Medicine, Queen's University, Kingston.

The Use of Plastics as Vehicles for Sulphonamides in Wounds. EINA M. CLARK and RONALD HARE, Connaught Laboratories, University of Toronto.

The Use of the Laboratory in the Control of Typhoid Epidemics. A. R. FOLEY, Ministry of Health and Social Welfare of the Province of Quebec.

The Preparation and Preservation of Typhoid V Suspensions for the Agglutination Test. J. M. DESRANLEAU, Division of Laboratories, Ministry of Health of Quebec, Montreal.

Coliform Organisms found in Private Wells. E. H. GARRARD, Department of Bacteriology, Ontario Agricultural College, Guelph.

Food Poisoning. C. E. DOLMAN, Connaught Laboratories (Western Division) and Department of Bacteriology and Preventive Medicine, The University of British Columbia.

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FRIDAY AFTERNOON

Private Dining Room No. 9, 2.30

The Effect of Glucose on Penicillin Potency Tests. A. G. LOCHHEAD and M. I. TIMONIN, Division of Bacteriology and Dairy Research, Science Service, Dominion Department of Agriculture.

Comparison of Neutralization and Complement Fixation Tests for Western Encephalomyelitis. CHAS. A. MITCHELL and J. WM. PULLIN, Division of Animal Pathology, Science Service, Dominion Department of Agriculture.

Examination of Sera from Persons resident in Manitoba, Ontario, and Quebec for Neutralizing Antibodies of Encephalomyelitis. CHAS. A. MITCHELL and J. WM. PULLIN, Division of Animal Pathology, Science Service, Dominion Department of Agriculture.

Recovery of Equine Encephalomyelitis Virus (Western Type) from Human Spinal Fluid in Alberta. RONALD GWATKIN and IRVIN W. MOYNIHAN, Division of Animal Pathology, Science Service, Dominion Department of Agriculture (Veterinary Research Laboratory, Lethbridge, Alberta).

Epidemiological Study of Intestinal Intoxication of Babes in General Hospital Nurseries. W. B. McCLURE, Division of Laboratories, Department of Health of Ontario.

Concentration and Purification of Influenza Virus. RONALD HARE, LAURELLA McCLELLAND, and JEAN MORGAN, Connaught Laboratories, University of Toronto.

Further Studies with H. influenzae, Type B. Part I—COLIN CAMERON and NELLES SILVERTHORNE, Part II—NELLES SILVERTHORNE and MYRTLE PATERSON, Connaught Laboratories, University of Toronto.

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Forest Resources: Professor G. G. Cosens
Water and Power: Professor R. F. Legget
Construction Projects: Professor C. R. Young
The Social Services: Professor S. K. Jaffary
Housing and Town Planning: Professor E. R. Arthur
The Ideals of Reconstruction: President H. J. Cody

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2. Avoid chilling! Dress warmly during the "pneumonia months," early winter to late spring. Lower home temperatures this winter may require warmer dress indoors. Chilling is especially risky when you are overtired. Change wet clothing and shoes as soon as possible.

3. Watch that cold! Respiratory infections often pave the way for pneumonia. It is best to take seriously even a common cold. If a cold is very severe or lingers on, be particularly careful. The wisest precautions are: *Go to bed . . . call the doctor!*

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